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Research Note

Some Aspects of Experimental Infections of *Trichostrongylus axei* in Domestic Rabbits (*Oryctolagus cuniculus*)

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ABSTRACT: *Trichostrongylus axei* have been maintained in domestic rabbits (*Oryctolagus cuniculus*), by serial passage, at the University of Kentucky since 1953 for an equine strain (A) and 1954 for a bovine strain (O). On 17 August, 1995, this research was terminated. Presentation here is mostly on cumulative data on number of serial passages, infectivity, and longevity of *T. axei* since 1984/1985. Comparison is made with earlier research, much of which has been published (Lyons et al., 1987).

KEY WORDS: *Trichostrongylus axei*, nematode, experimental infections, longevity, domestic rabbits.

The domestic rabbit is an excellent host for *Trichostrongylus axei*, not only for study of this parasite but also for providing a source of larvae for research in other hosts (Drudge et al., 1955; Leland and Drudge, 1957; Leland et al., 1959a, b, 1960a, b, 1961; Leland, 1963; Lyons et al.,

1987). Advantages of the rabbit as a donor are its small size, potential life span of several years, and prolonged patency of > 5 yr for *T. axei* (Lyons et al., 1987).

Two strains (A from equids and O from bovids) of *T. axei* were isolated and established in 1953 (Strain A) and in 1954 (Strain O) in domestic rabbits. Both strains were maintained in rabbits, by serial passage, until 17 August, 1995, when this research was terminated. Strain O was temporarily lost in rabbits on 24 September, 1959 but restarted in this experimental host on 5 November, 1959 from calves previously infected with this strain. More complete records on the infections involved in these serial passages of *T. axei* in rabbits have been kept since 31 July, 1962. From that date through 25 October, 1985

Table 1. Data on experimental infections of *Trichostrongylus axei* in 6 domestic rabbits positive for specimens at termination of the research.

Rabbit no.	Administration of larvae		Eggs in feces		Adults in stomach at necropsy*			Longevity of parasites (yrs)
	Date	No.	Positive	Examined	♂	♀	Total	
20-A†	3/7/89	2,580	6/13/94	6/13/94	0	1	1	6.5
23-O‡	3/7/89	2,600	4/30/93	6/13/94	0	9	9	6.5
3272-O	1/18/93	1,350	6/13/94	6/13/94	11	27	38	2.0
3273-O	1/22/93	1,500	8/18/93	6/13/94	0	3	3	2.0
3278-O	1/18/93	1,350	8/18/93	6/13/94	17	21	38	2.0
3279-O	1/22/93	1,500	None	6/13/94	0	4	4	2.0

* 17 August 1995.

† A = equid strain—5 other rabbits (1 given L₃ at 6.5 yr and 4 at 2 yr previously) were negative for *T. axei* specimens.

‡ O = bovid strain—3 other rabbits (1 given L₃ at 8 yr and 2 at 2 yr previously) were negative for *T. axei* specimens.

for Strain A and 21 December, 1984 for Strain O, specific data pertaining to the infections have been published (Lyons et al., 1987)

The present paper is an update on data accumulated through 17 August, 1995. Besides data on presence of eggs in feces (the basis for determining patency), counts were made of specimens of *T. axei* recovered from stomachs of 14 rabbits (6, Strain A; and 8, Strain O) euthanatized and examined at necropsy at termination of the research project. In the 1987 publication (Lyons et al., 1987), counts of *T. axei* in rabbit donors were not made. Details and references on methodology and other background information on infections of *T. axei* in rabbits were previously published (Drudge et al., 1963; Lyons et al., 1987). Fecal samples for determination of presence of *T. axei* eggs by EPG (eggs per gram of feces) counts (Lyons et al., 1976) or qualitative method were collected periodically (usually every 2 wk) until 13 June, 1994, the last date of collection. In 1987, the donor rabbits were transferred to new quarters. At about the same time, the feed ration was changed and also a new supplier of donor rabbits was necessitated. Chance of natural reinfection of the rabbits with *T. axei* infective third-stage larvae (L₃) developing from eggs passed in feces was virtually impossible (Lyons et al., 1987).

Comparison of data on *T. axei* donor rabbits from 1962 through 1984/1985 (Lyons et al., 1987) and the end of those periods to 1995 (present paper) revealed several differences.

For Strain A in the period 1962–1985, there were 11 passages in 31 donor rabbits. Highest EPG count was 3,600, with patency being 154–2,055 days. The mean EPG count for all rabbits was 420 during this period, whereas, for the pe-

riod 1985–1995, there were 4 passages in 31 rabbits. The highest EPG count was 290, with patencies varying from 70 to 1,945 days. For this period, there was a mean EPG count of 89. The total passages for the 33-yr study period were 15 in 62 rabbits. A decline in EPG counts began in 1986 and, since then, only 3 of 19 rabbits had values >100. Difficulty in establishing infections was evident since 1987. In September of that year, none of 8 *T. axei*-naïve rabbits developed infections after administration of L₃, as evidenced by negative EPG counts for 2 mo post-inoculation. At this time, *T. axei* L₃ were readministered to 4 of these rabbits; all 4 developed infections. In January 1993, none of 4 donors became infected after being given larvae. Before the 1987 problem with infectivity, all donors developed infections following initial administration of L₃. Examination of stomachs of 6 of the Strain A donors at necropsy at termination of the experiment revealed 1 (No. 20) positive for *T. axei* (1 ♀); this donor was given L₃ 6.5 yr previously (Table 1).

For Strain O, in the 1962–1984 period, there were 14 passages in 32 rabbits. The highest EPG count was 1,350, and patency ranged from 71 to 1,810 days. During the 1984–1995 period, there were 5 passages in 33 rabbits. The highest EPG count was 490, and patency varied from 140 to 1,725 days. Total passages for the 33-yr period were 19 in 65 donor rabbits. A decline in EPG counts began in 1985 and, since then, only 4 of 29 rabbits had values of >100. There were only 3 rabbits that did not have a positive EPG count after being given L₃, 1 in 1987 and 2 in 1993. At necropsy for Strain O rabbits, 5 (1 given L₃ at 6.5 yr and 4 at 2 yr previously) of 8 harbored 3–38 specimens of *T. axei* each (Table 1).

Both *T. axei* strains showed decreased infectivity, especially Strain A, the last several years. Exactly why is uncertain, but several reasons can be surmised. Possibilities are (1) a new source of rabbits with different genetic bloodlines, (2) change in type of food for the rabbits, (3) different location and environmental conditions for housing rabbits, and (4) senility or loss of vigor of the *T. axei*. It is of interest that *T. axei* infections survived for 6.5 yr in donor rabbits; they may have lasted longer if the donors were not euthanatized. Also, 1 rabbit survived for 8 yr although *T. axei* in it apparently did not. The survival of these strains of *T. axei* for over 40 yr with relatively few passages shows the advantageous use of domestic rabbits as experimental donors for this parasite. However, certain unknown factors may determine the infectivity of the donor rabbits with this parasite.

Statistical analysis was done to determine significance (at 5% level) comparing earlier with later data for Strain A (1962–1985 vs. 1985–1995) and for Strain O (1962–1984 vs. 1984–1995) on (1) highest EPG counts, (2) infectivity (No. of rabbits given infective L_3 vs. No. of rabbits infected), and (3) patency. Analysis was by a standard *t*-test for data on EPG counts/patency and by Fisher's exact test for data on infectivity. The values for the earlier period were significantly greater than the later period for all 3 factors for Strain A and 2 factors (no significance for infectivity) for Strain O. This supported the observation of a decline in establishment of *T. axei*, especially Strain A, in rabbits in about the last 10 yr.

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